Truck Scales

Map Code: 28 and 28A, Plate II-1
Status: existing - 28:3rd quarter 1976
28A: 4th quarter 1989

Both truck scales consist of a standard highway scale unit of a size and capacity suitable for weighing medium duty highway coal trucks. Also associated with each scale is a small metal building in which the controls and read-out are located. The scales weigh the trucks before and after loading to determine the tonnage of coal being sold. They are calibrated and certified by the State at least once each year. The truck scales are located within the approved surface drainage control area.

Explosives Storage

Map Code: 29, Plate II-1
Status: existing - prior to 1975

The explosives storage consists of a prefabricated, skid-mounted sheet metal box measuring approximately 6 feet on a side. It is equipped with a heavy steel door and a lock guard. The explosives magazine is presently located near the scrap yard.

The Emery Mine does not currently use explosives for coal production: however, explosives are used from time to time for special projects. Therefore, only a minimal amount is in storage at a given time.

The explosives storage meets MSHA guidelines and is contained within the surface drainage control area.

Coal Stockpile Areas/Coal Mine Waste Area

Map Code: 31, Plate II-1
Status: existing - lower piles prior to 1975
- northwest pile 3rd quarter 1982

The CROM product is discharged into a "live" storage pile at the tipple, where it is either loaded immediately onto trucks with a front-end loader or shuttled to a stockpile.

The mine has three static stockpile areas. The "upper" stockpile, located north of Quitchupah Creek in the mine yard, has a maximum capacity of 25,000 tons. The "lower" stockpile is located south of Quitchupah Creek and has a storage capacity of 20,000 tons. The third stockpile is northwest of the mine office near the mine entrance gate. This area is located in the southern portion of area 31. This pile has a capacity of 150,000 tons and is used to handle excess mine production during times of decreased near term coal sales. Under normal operating conditions, approximately 15,000 tons of combined products are stockpiled at any time, with a monthly stockpile flux of about 5,000 tons. This allows adequate surge capacity but eliminates the problems of stockpile fires and the expense of rehandling.

The existing Coal Mine Waste pile is located in the northern portion of area 31. This pile has an active MSHA Coal Refuse ID No.1211-UT-09-00079-01. The MSHA permit granted an initial exemption from the 2 foot compaction requirement, and allows for only lateral extension of the pile in 2 foot compacted lifts in the future. Consol will need to add to the pile in the next 5 years. The amount of underground development waste that will be placed on the pile will come from U/G overcast development. The volume should not exceed 600 yards. The material will be placed in less that 2 foot lifts and compacted per 30 CFR Part 77.215.

All of the stockpile areas are contained within the approved surface drainage control system. Refer to CH VI App VI-6 for drainage design for the coal mine waste pile. Refer to CH II, pg 20 and CH V Section V.A.4 for a discussion on roof and floor characteristics (underground development waste) and Section V,A,5 for a discussion of acid, alkaline, toxic potential. Also refer to CH VI section VI.2.8.3 (PHC) for a similar discussion.

Sewage Treatment System

Map Code: 32, Plate II-1
Status: existing - 4th quarter 1975

The mine sewage system consists of a 13,500-gallon septic tank, a pump system, and a 30,000-ft^2 leach field. The design capacity of the system is 13,500 gallons per day, The system now processes about 7,000 gallons of raw sewage per day produced from the bathhouses and the office/warehouse. The system was approved for construction by the Utah State Department of Health on September 22, 1975.

Bridge on Quitchupah Creek

Map Code: 33, Plate II-1
Status: existing - 3rd quarter 1979

The bridge on Quitchupah Creek is constructed of a multiplate arch on a concrete foundation with concrete wingwalls and is equipped with guardrail. It is designed to pass 2,230 cfs of water. The bridge was installed to allow access to the stockpile area south of Quitchupah Creek. It replaced two 3-foot-diameter culverts which were determined to be undersized for design flood conditions. This structure was approved for construction by the Utah State Division of Oil, Gas, and Mining on March 19, 1979.

Non-Coal Waste Storage Area

Map Code: 34. Plate II-1
Status: existing - prior to 1975

The non-coal waste storage area consists of two small pits dug into the side of the hill in the stockpile area south of Quitchupah Creek. The pits measure approximately 20'x40'x10'.

Waste materials such as trash, timbers, and cement blocks are hauled from the mine and temporarily stored in the two waste pits. Periodically, the material is loaded onto coal trucks and hauled to a private landfill which is not controlled by Consol.

The pits slope into the hill so that surface water entering the pit is contained. The storage area is within the approved surface drainage control system.

Revised 11/07

Permenant Underground Development Waste Disposal Site

Map Code: identified by name, Plate II-1
Status: Proposed

Underground development wastes currently stored on the northwest coal stockpile site and any new development wastes generated will be permanently buried in this disposal site. This disposal area is a 2.1 acre site located at the gravel borrow pit on the hilltop, east of the northwest coal stockpile area. A complete description of this disposal site is given in this part under UMC 784.19, with design information located in Chapter IV.

Parking Area

Map Coder 35, Plate II-1
Status: existing - prior to 1975

The employee parking area is located near the office and bathhouses and provides ample space for employees and visitors. The parking area is within the approved surface drainage control area.

Mine Yard Roads

Map Code: 36, Plate II-1
Status: existing - prior to 1975

The mine yard road system is comprised of four (4) sections. Two (2) are Class I roads and two (2) are Class II roads. The first section, a Class I road, begins at the mine gate and ends at the warehouse office building. Section 2, a Class II road, branches off of section 1 and accesses the storage area west of the warehouse/office building. Section 3 is a Class I road which starts at the mine yard and accesses the coal storage area south of Quitchupah Creek. This section crosses an approved bridge over the Creek. Section 4, a Class II road, is located between the tipple stockpile and the ventilation fan building. As-built cross sections for the Class I roads are contained in Chapter IV

All of these roads are within the approved surface drainage control area and are periodically watered down during dry weather to prevent fugitive dust.

Mine Rescue Storage Area

Map Code: 37, Plate II-I
Status: existing - prior to 1975

This structure is a utility trailer parked in the mine yard. It is used to provide mobility for the mine rescue equipment in the event that it (and the mine rescue team) is needed elsewhere. This unit is contained within the approved surface drainage control system.

III.A.2 TIMING, SEQUENCE AND BONDING

UMC 784.13(b)(1), UMC 784.16(a)(2)(iv), UMC 784.16(a)(3)(iv)

The following reclamation schedule forecasts the timing of reclamation activities at the Emery Mine. The schedule is based on the assumption that mining will continue through the year 20150.

Contemporaneous Reclamation

1st Half, 1982	Reclaimed sections of road to Pond No. 1 and Pump #1
1986	Reclaimed old abandoned mine portal and associated borrow area for backfill.

Final Abandonment

~~2nd - 4th Qtr. 1991~~12 months after cessation of use	Reclamation of development waste disposal site after wastes stored on the northwest coal stockpile area are buried.
~~1991 - 4th Qtr., 2010~~12 months after cessation of use~~Ongoing~~ ~~r~~Reclamation of development waste disposal site ifas newly generated wastes are disposed.	
~~2nd - 4th Qtr., 1991~~12 months after cessation of use	Reclamation of disposal site for excess cut material generated from initial development of the waste disposal site.
~~1992 - 4th Qtr., 2010~~12 months after cessation of use~~Ongoing~~ Rreclamation of disposal site used for excess cut material.	
From Construction -	Ongoing reclamation of ~~4th Qtr., 2010~~ proposed coarse refuse disposal site following construction of this facility as newly generated wastes are disposed.

~~Final Abandonment~~

~~1st - 4th Qtr. 2011~~12 months after cessation of use	Removal of all non-earthen structures.
~~1st - 2nd Qtr. 2012~~12 months after cessation of use	Surface debris removal, regrading, final covering of excess spoil and development waste disposal sites, final covering of coarse refuse disposal site. Dewater freshwater cell of slurry pond, removal of Ponds No. 1, No. 4, and No. 6 and embankments, sealing of mine openings, backfilling and regarding, removal of culverts and bridges, regarding roads and parking areas, topsoil respreading.

Revised 11/07

~~3rd - 4th Qtr. 2012~~12 months after cessation of use	Seedbed preparation and seeding, fertilization, mulching, and erosion control.
~~2nd - 3rd Qtr. 2013~~12 months after cessation of use	Erosion control and reseeding.
~~1st - 2nd Qtr. 2014~~12 months after cessation of use	Regrade, respread topsoil and revegetate remaining surface water control facilities and slurry pond.

The following reclamation schedule forecasts the timing of reclamation activities at the 4th East Portal Site. Reclamation is anticipated to begin upon final removal of underground machinery.

Year	No. Work Days	Description of Reclamation Work
1	21	Seal Underground Entries and Backfill - 3 Entries - MSHA Approved Seals
1	30	Removal of Surface Structures (conveyor, bins, scales, screens/crusher, fan)
1	5	Removal of Footers and Foundation (concrete and/or steel)
1	5	Pick-up coal stockpile and place in bottom of boxcut opposite side of U/G entries.
1	2	Clean-out Sediment pond - place sediment in boxcut
1	60	Backfill boxcut & Lower Pad Area. Backfill to be placed in no more than 3 foot lifts. Material to be compacted with traversing of heavy equipment.
1	5	Backfill Air Shaft - Non-toxic material
1	2	Remove gravel from site - use as backfill material in airshaft.
1	10	Restoration of Ephemeral Stream approx 500 feet.
1	2	Respread Berm Material
1	2	Construct Silt Fences and/or other alternate sediment control (Temporary)
1	5	Placement of Rock Structures along Stream Restoration
1	6	Respread & Roughen Topsoil
1	2	Seed & Mulch Affected Surface
2 & 3	2	Refill Air Shaft
2	3	Backfill of Temporary Diversion approx 500 feet.
2	3	Respread & Roughen & Seed & Mulch Topsoil of Temp. Diversion
4	5	Place Permanent Concrete Cap and Monument Marker
6	3	Remove Sediment Basin #9 Backfill & Topsoil
6	2	Install silt Fence downstream toe of basin #9 removal
6	2	Seed & Mulch Basin #9 and Topsoil Pile Location
7	2	Remove Alternate Sediment Control (silt fence, straw bales, check dams)

Revised 10/2002
Revised 11/07

All toxic-forming or acid-forming material will be disposed of by the above methods within thirty (30) days after first being exposed on the mine site. However, temporary storage of these materials, in accordance with UMC 817.48(c), in excess of thirty (30) days may be requested if immediate burial or treatment is not feasible and will not result in any material risk of water pollution or other environmental damage.

Underground development wastes currently located at the ~~temporary~~ coal mine waste ~~stockpile~~ site and any future development wastes will be buried in the Permanent Underground Development Waste Disposal Site shown on Plate II-1. When the coarse refuse disposal area has been constructed, underground development wastes will be disposed of in that site. Reclamation of the Underground Development Waste and Excess Cut Material Disposal Sites will be done contemporaneously as described in Chapter III.A.2. The development wastes will be covered with four (4) feet of non-toxic material and graded to approximate pre-disturbance contours. Since the area was previously disturbed prior to August 3, 1977, no original cover material is available. Use of sand and gravel deposits which will be stockpiled during construction, will provide a material better than the pre-disturbance soils for establishing vegetation. For additional information on soils, please refer to Chapter III.A.2 and Chapter VII Appendix 2. The excess cut material from this site will be placed in the bermed depression west of the office. Sideslopes will be maintained at 3H:1V. For additional detail concerning design and volume calculations, cross sections, and plan views of these two sites (Underground Waste and Excess Cut material disposal sites) please refer to Chapter IV.C.1. Seed mixes for temporary and permanent cover will be utilized as described in Chapter III.A.2.

Final reclamation of the proposed coarse refuse disposal site will commence upon final abandonment of the site. Contemporaneous reclamation of this facility will be conducted as described in Chapter III.A.2. Final reclamation will consist of final grading to achieve the final postmining contour as shown on Plate III-7. After completion of final grading, a minimum of four (4) feet of non-toxic material will be placed on the exposed facility unless testing shows that less fill material may be utilized as cover. Cover material will be available from the excavated material stockpiled during the construction of the slurry impoundment. For additional detail concerning the materials balance and design information for this facility may be found in Chapter IV.C.2. The location of this structure is shown on Plate II-2.

Following completion of mining, the slurry refuse ponds and freshwater cell will be allowed to dry. The freshwater cell will be pumped down and discharged into Pond 001 prior to reclamation of Pond 001. After the refuse ponds have been allowed to dry (anticipated time for drying is from two (2) to four (4) years), the refuse dike and slurry will be graded into the freshwater cell. Grading will be conducted to achieve an average uniform final slurry elevation of 5942

CHAPTER IV

ENGINEERING DESIGNS

PART		Page
IV.A	UNDERGROUND MINE PLAN	
IV.A.1	UNDERGROUND MINE PLAN	1-2
IV.A.2	4 EAST PORTAL	2-8
IV.A.3	MAXIMUM ECONOMIC RECOVERY	9
IV.A.4	USE OF EXPLOSIVES	10
IV.B	RECLAMATION COST ESTIMATES	11-18
IV.C.1	UNDERGROUND DEVELOPMENT WASTE DISPOSAL & EXCESS SPOIL SITES	19-26
IV.C.2	COAL PROCESSING WASTE BANK (COARSE REFUSE DISPOSAL)	27-29
IV.C.3	COAL PROCESSING WASTE: DAMS AND EMBANKMENTS (SLURRY IMPOUNDMENT)	30-39
IV.C.4	COAL MINE WASTE PILE	39a
IV.D	ROADS	40-43
IV.E	SUPPORT FACILITIES	44

Revised 10/2002
Revised 11/2003
Revised 11/07

IV.C.4 EXISTING COAL MINE WASTE PILE

UMC 817.71-.74

Site Description

General

This site is used for storage of coal mine waste and does not involve valley, head-of-hollow or durable rock fills. Refer to CH IV.C.4 Fig 1 for detail.

The storage area is located on a previously approved coal stockpile area (CH II Map code 31, Plate II-1) sometimes referred to as the northwest coal stockpile area throughout the MRP. Ownership Plate I-1 shows Consol as owner of surface and coal at this site. The site is crossed by a service road that accesses the water tank and substation (See site 31 Map - Plate II-1). The area is underlain by abandoned room and pillar mine workings that were mined in the 1940's. Old mine maps show that 40% of the coal has been removed. The pile contains approximately 37,000 cu. yds. of material, and the mine anticipates adding approximately 600 cu. Yds in the future. The existing Coal Mine Waste Pile has an existing MSHA Coal Refuse ID No. 1211-UT-09-00079-01. The MSHA permit granted an initial exemption from the 2 foot compaction requirement, and allows for lateral extension of the pile in 2 foot compacted lifts per 30 CFR Part 77.215. Consol intends to classify this site as the active Coal Mine Waste Pile and continue to add to it if needed until the mine begins final reclamation. Final reclamation of the Coal Mine Waste Pile will follow the previously approved reclamation plan as outlined in CH III. The Coal Mine Waste Pile will be placed in the Proposed Underground Development Waste Site (See site 9 Map - Plate II-1) during final reclamation.

Geology

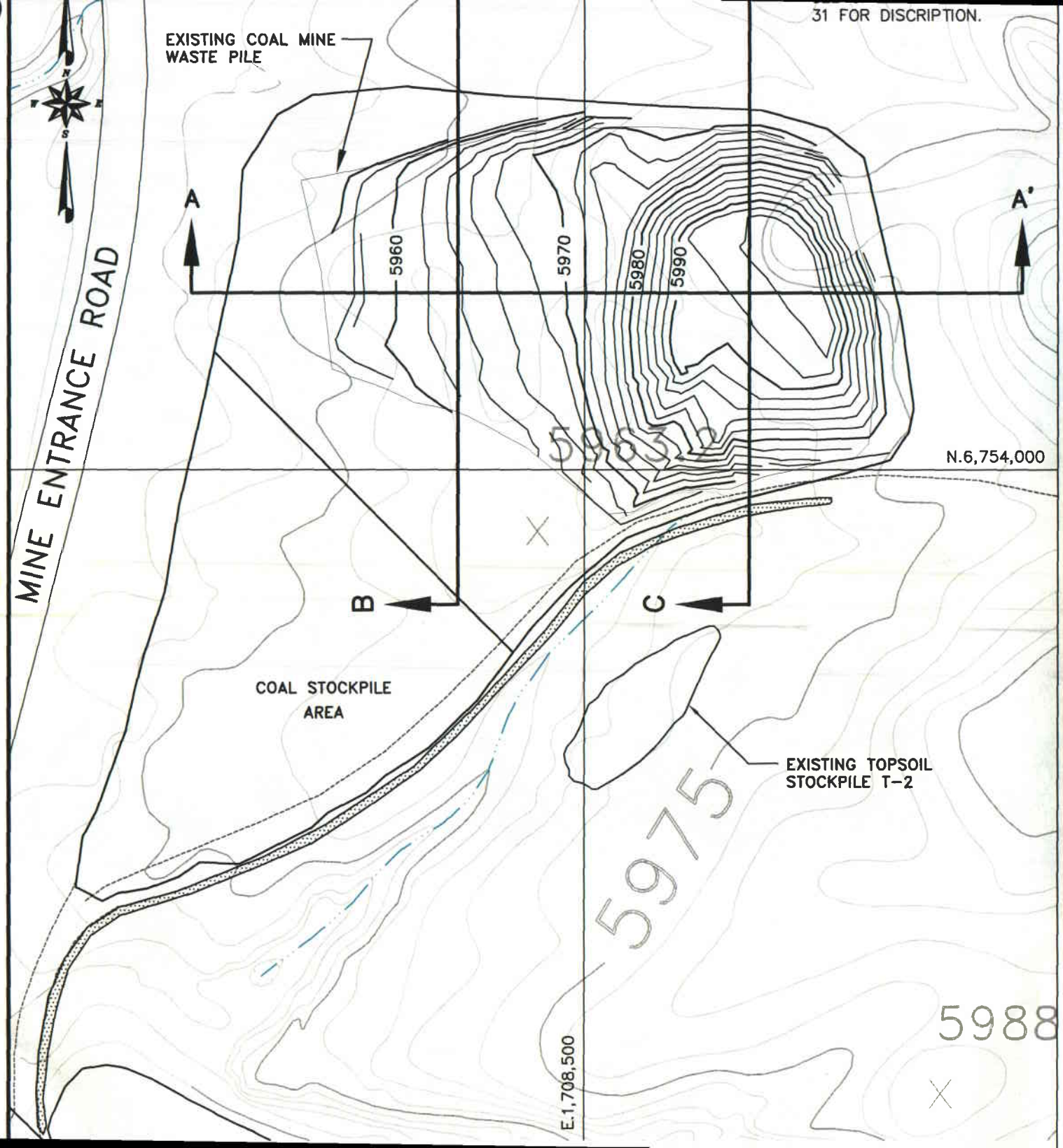
Plate VI-2 titled Geology of the General Mine Area shows this area to be near the top of a layer of Bluegate shale which is above the upper portion of the Ferron sandstone unit which constitutes the roof material in the mine. The overburden is about 70-75 feet thick.

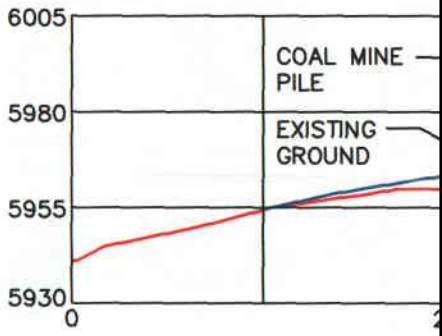
Hydrology

A survey of the area was made and no seeps or springs were identified. This is consistent with the geological information shown on Plate VI-2. This plate shows seepage emanating from terrace deposits located north of the site. These seeps are sustained from the irrigation and leaching applications of local farmers using diverted Muddy Creek water. Groundwater movement is further restricted by the relatively impermeable Bluegate shale layer on which the site will be built.

All surface drainage from the site reports to existing sedimentation control structures (see CH VI, Pond 8 design).

31 FOR DISCRIPTION.





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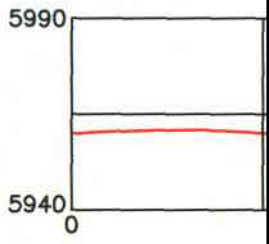

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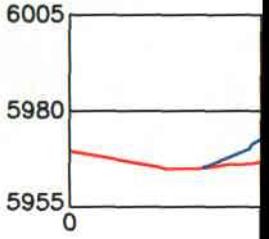


Structures and facilities\DWG\FIG1-PILE.dwg, 11/9/2007 9:09:42 AM

DRAINAGE DITCH DESIGN

The drainage ditch designs consist of, in general, a narrative description, design parameters, flow calculations, flowline profile and cross-section for each ditch. The design parameters include drainage area, design storm information, curve number and channel dimensions. Due to the relatively large size of their drainage areas, flow calculations are used to derive the design peak flow rate for each diversion. The design peak flows for the smaller Ditches No. 1 through No. 5 are approximated using SCS peak flow rate graphs or modeled using HEC-HMS computer program. This information is then used within Manning's Equation to determine the specific flow characteristics of each ditch.

The design storms used for the ditches are: 10-year/24-hour for temporary ditches not associated with refuse disposal areas and 100-year/24-hour for the permanent Stream Diversion, ~~and~~ Waste Disposal Site Diversion, and ditches associated with refuse disposal areas. The ditches are designed to maintain flow velocities during design storm peak flows under 4.0 fps in earthen channels and less than 12 fps in rock. In earthen channels where gradient slopes result in peak velocities exceeding 4.0 fps, rock checks and/or other stabilizing structures will be installed to mitigate erosion. Side slopes will be constructed with slopes of 2H:1V or flatter in earthen channels and 1H:1V or flatter in rock. Channel bottoms will be controlled with rock riprap where deemed necessary. The ditch spoil will be graded and seeded as soon as possible. These measures will serve to reduce erosion of the spoil and the sediment load in the ditch conveyance. See Plate VI-10 for drainage ditch locations.

TEMPORARY DITCH NO. 1

Ditch No. 1 collects runoff from a small drainage area north of the Existing Coal Stockpile/Coal Mine Waste (Stockpile/Disposal Site) conveying it west and then south to a confluence with Temporary Ditch No. 2. The ditch parallels Ditch No. 2 but at a lower elevation. Drainage area to Ditch No 1 consists of the out slope of the berm forming Ditch No. 2 as well as some undisturbed area. Runoff from the Stockpile/Disposal Site does not enter Ditch No. 1. Total drainage area to Ditch No. 1 is 1.1 acres.

Since this ditch does not convey refuse area drainage and would be classified as a miscellaneous ditch, the 10-year, 24-hour storm event is required for the design. The ditch is included in the HEC-HMS 100-year, 6-hour computer model for Ditch No. 2 to verify the ditch is adequate. Flow depths and velocities are checked using the 100-year event runoff.

Ditch No. 1 consists of a steep section and a flat section (Ditches 1A and 1B), respectively. A portion of Ditch 1A is a natural drainage channel and a portion is excavated as shown on *Figure VI-27*. Drainage area for Ditch 1A is designated as HYDD-1 in the HEC-HMS model and the area for Ditch 1B is HYDD-2. From the HEC-HMS model shown for Ditch No. 2 design, flows for the sections are 0.6 cfs and 1.1 cfs. Both sections are modeled as triangular even though some areas have a small bottom width. The sections have 4:1 side slopes and a Manning's "n" of 0.030. The steep section has a flow gradient of 0.048 feet/foot (ft/ft) and the gradient for the flat section is 0.009 ft/ft.

Using Manning's Open Channel Flow Equation:

$$Q = \frac{1.49}{n} (A) (R)^{2/3} (s)^{0.5}$$

where A = area (ft^2)
R = area/wetted perimeter
s = ditch gradient

From trial and error, flow depth and velocity for each section are:

Steep section – 0.25-foot flow depth at 2.6 fps
Flat section – 0.42-foot flow depth at 1.6 fps

Ditch No. 1 is adequately sized for the 100-year event. See *Figures VI-27, 27A,* and *27B* for profile and cross section of Ditch No. 1. The *Pond No. 8, Plan View and Drainage Map* drawing in *Appendix VI-7* shows the plan view of this structure.

TEMPORARY DITCH NO. 2

Ditch No. 2 intercepts runoff from the Stockpile/Disposal Site and conveys it to Culvert B after combining with discharge from Ditch No. 1. Discharge from Culvert B is directed to Sediment Pond No. 8. Total drainage area for Ditch No. 2 is 6.2 acres. The 100-year, 6-hour storm event is used to design the ditch per Utah Department of Natural Resources regulations 746.212.

The ditch consists of three sections designated Ditches 2A, 2B, and 2C. Ditch 2A intercepts runoff from the east and north sides of the disposal area. An undisturbed portion of this drainage area (Area A on the *Pond No. 8, Plan View and Drainage Map*) lies east of the refuse area. Runoff from Area A is shown as HYD2A on the HEC-HMS computer model. Area B (HYD2B) consists of the east and north out slopes of the refuse pile. Total drainage area for Ditch 2A is 2.0 acres. Ditch 2A has a bottom width of 2 feet with 2:1 side slopes and a flow gradient averaging 0.0425 ft/ft. Peak flow in this section from the HMS model is 2.7 cfs. This flow is routed through the next section (Ditch 2B).

Ditch 2B intercepts drainage from Area C (HYD2C) consisting of the south and west sides of the refuse pile and the flat area west of the pile. The top of the pile has been graded to direct runoff to the south and avoid the steeper ditch section (Ditch 2A). The peak flow from Ditch 2A and runoff from Area C is 10.~~1~~2 cfs. Ditch 2B has a bottom width of 2 feet with 2:1 side slopes and a flow gradient of 0.0068 ft/ft. A rock-lined channel at the end of Ditch 2B conveys the flow down a slope to Ditch 2C, combining with discharge from Ditch 1.

Peak flow for Ditch 2C is 11.~~1~~3 cfs. This section has a 3-foot bottom width with 2:1 side slopes and a 0.029 ft/ft flow gradient. The channel is cut in bedrock, making it adequate for the 4.8 fps flow velocity.

Flow depths and velocities are calculated using Manning's Open Channel Flow Equation.

$$Q = \frac{1.49}{n} (A) (R)^{2/3} (s)^{0.5}$$

where A = area (ft^2)
R = area/wetted perimeter
s = ditch gradient
n = roughness factor (0.030)

Using trial and error, flow depths and velocities are:

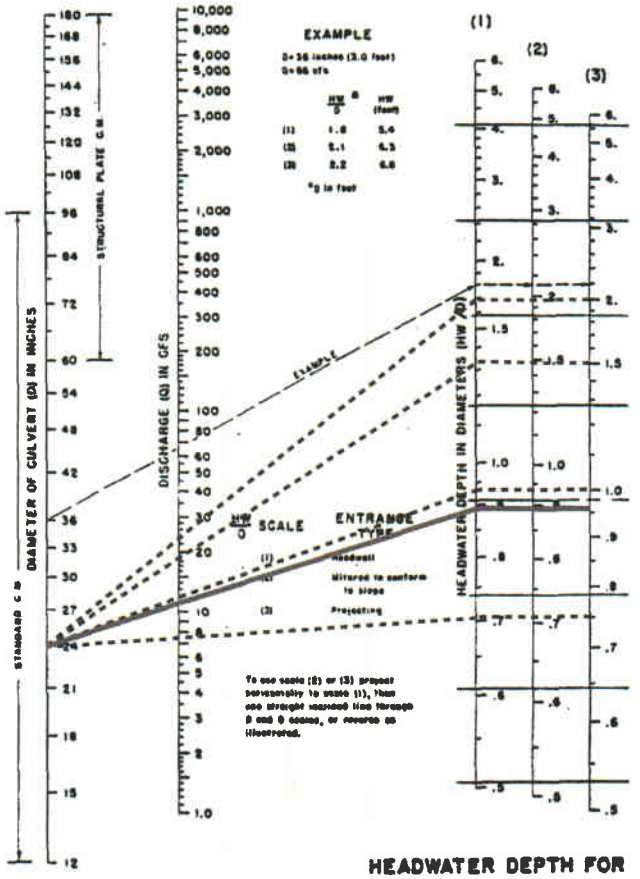
Ditch 2-A – 0.3-foot flow depth at 3.8 fps
Ditch 2-B – 0.9-foot flow depth at 2.9 fps
Ditch 2-C – 0.6-foot flow depth at 4.8 fps

See *Figures VI-27, 27A,* and *27B* for profile and cross sections of Ditch No. 2. The *Pond No. 8, Plan View and Drainage Map* in *Appendix VI-7* shows the plan view of this structure.

CULVERT B

Culvert B is an existing 24-inch corrugated metal pipe (CMP) conveying drainage from Ditch No. 2 under the road to the Stockpile/Disposal Site. Invert elevation of the pipe is 5939.6 and the top of road/top of ditch elevation is 5943.2, allowing a flow depth of 3.6 feet before overtopping.

From the HEC-HMS computer model for Ditches 1 and 2, the 100-year, 6-hour event peak flow to Culvert B is 11.~~1~~3 cfs. A series of discharges to headwater depths from the nomograph shown below were input into the model. From the nomograph and HEC-HMS output, the headwater depth required to achieve 11.~~1~~3 cfs is 1.9 feet. The culvert is, therefore, adequate to convey the peak discharge without overtopping.



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

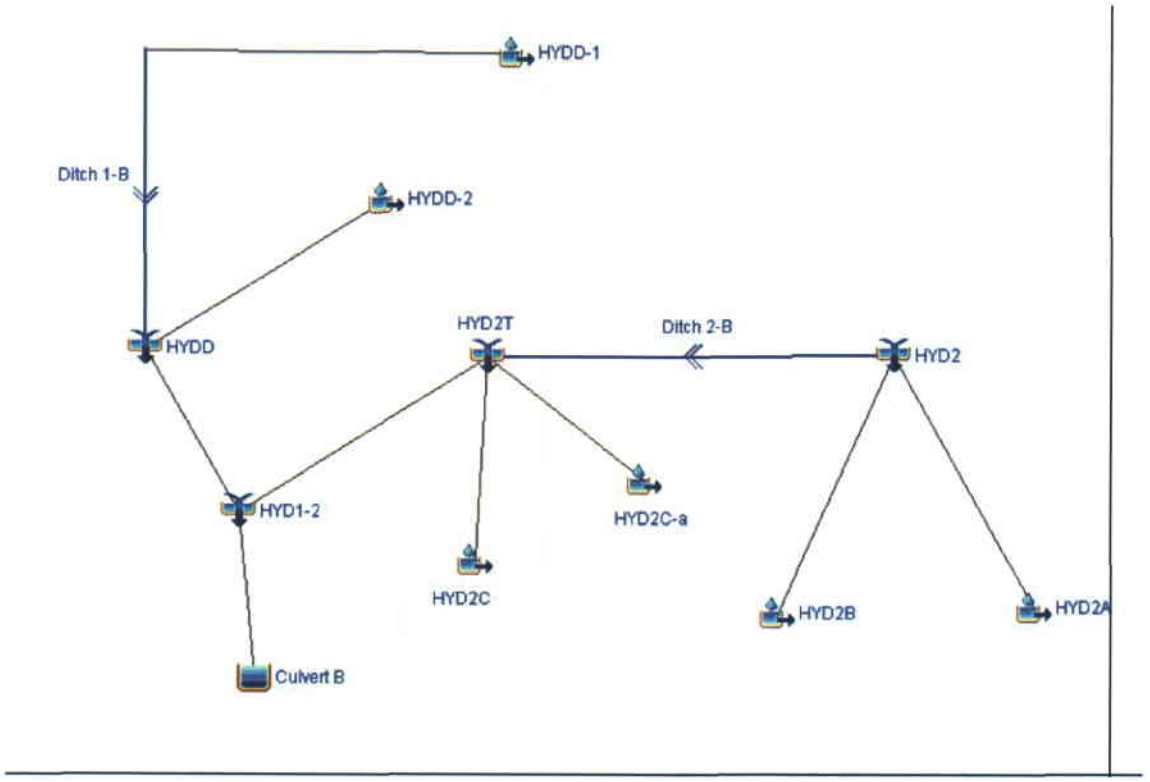
(From Ref. Hyd. Eng. Circular No. 5, USBRP, 1965)

HEC-HMS HYDROLOGIC MODEL

Due to the limited printing capability of the public version of HEC-HMS, screen images of the HEC-HMS input and output are presented along with subbasin hydrologic parameters used in the model. The watershed and subbasins are shown on *Pond No. 8, Plan View and Drainage Map* in *Appendix VI-7*. Pond No. 8 was sized using results from an HEC-1 computer model presented in *Appendix IV-9 – Sediment Pond No. 8*. The total drainage area reporting to Pond No. 8 does not significantly change under this evaluation of Temporary Ditches No. 1 and 2. Therefore, the Pond No. 8 design has not been revised.

Ditch No. 2 intercepts and conveys drainage from the Stockpile/Disposal Site. Per Utah regulations, the structure is designed to handle the 100-year, 6-hour storm event. Total rainfall for the 100-year, 6-hour storm is 1.80 inches. The same rainfall distribution used in the original HEC-1 model is used in this HEC-HMS model. A computational time interval of one minute was used due to the small lag times in the subbasins.

Refuse Area HEC-HMS Network Diagram:



Subbasin Hydrology:

Description of Subbasins:

HYD2A Unaffected area east of Stockpile/Disposal Site (Area A)
HYD2B Stockpile/Disposal Site, east and north outslopes (Area B)
HYD2C-a Top of Pile (Area C)
HYD2C Remaining Stockpile/Disposal Site and area west of pile (Area C)
HYDD-1 Unaffected area north of Stockpile/Disposal Site (Area D)
HYDD-2 Affected area west of Ditch 2B (Area D)

Subbasin Parameters:

Subbasin ID	Area (ac)	Area (mi^2)	CN	S	L (ft)	Y (%)	l_T (min)
HYD2A	1.3	0.0020	80	2.50	450	20	2.2
HYD2B	0.7	0.0011	90	1.11	80	30	0.3
HYD2C-a	0.5	0.0008	90	1.11	60	1	1.4
HYD2C	~~4.2~~3.7	0.00~~665~~8	90	1.11	600	5	4.0
HYDD-1	0.5	0.0008	80	2.50	60	10	0.6
HYDD-2	0.6	0.0009	80	2.50	35	25	0.3

CN = SCS Curve Number
S = (1000/CN) – 10
L = Hydraulic Length of Watershed
Y = Average land slope
lT = SCS lag time in hours = $(L^{0.8} (S + 1)^{0.7})/(1900\ Y^{0.5})$

Ditch Geometry:

Ditch ID	Length (ft)	Bottom (ft)	Side Slope (xH:1V)	Flow Gradient (ft V:1 ft H)	Manning's "n"	Lining
Ditch 2A	670	2	2	0.0425	0.030	Earthen
Ditch 2B	600	2	2	0.0068	0.030	Earthen
Ditch 2C	120	3	2	0.0292	0.030	Rock
Ditch 1A	495	0	4	0.0480	0.030	Earthen
Ditch 1B	595	0	4	0.0090	0.030	Earthen

Not all ditches were included in the HEC-HMS model.

A small rock-lined channel at the end of Ditch 2B was not modeled. The channel conveys flow from Ditch 2B to Ditch 2C.

HEC-HMS Output:

Project : Emery Simulation Run : Run 1 Subbasin: HYD2A

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Discharge :	1.32 (CFS)	Date/Time of Peak Discharge :	01Jul2007, 03:00
Total Precipitation :	0.19 (AC-FT)	Total Direct Runoff :	0.05 (AC-FT)
Total Loss :	0.14 (AC-FT)	Total Baseflow :	0.00 (AC-FT)
Total Excess :	0.05 (AC-FT)	Discharge :	0.05 (AC-FT)

Print Close

Project : Emery Simulation Run : Run 1 Subbasin: HYD2B

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Discharge :	1.41 (CFS)	Date/Time of Peak Discharge :	01Jul2007, 03:00
Total Precipitation :	0.11 (AC-FT)	Total Direct Runoff :	0.05 (AC-FT)
Total Loss :	0.05 (AC-FT)	Total Baseflow :	0.00 (AC-FT)
Total Excess :	0.05 (AC-FT)	Discharge :	0.05 (AC-FT)

Print Close

Project : Emery Simulation Run : Run 1 Junction: HYD2

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Outflow :	2.73 (CFS)	Date/Time of Peak Outflow :	01Jul2007, 03:00
Total Outflow :	0.10 (AC-FT)		

Print Close

HEC-HMS Output (continued):

Project : Emery Simulation Run : Run 1 Reach: Ditch 2-B

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Inflow :	2.73 (CFS)	Date/Time of Peak Inflow :	01Jul2007, 03:00
Peak Outflow :	2.57 (CFS)	Date/Time of Peak Outflow :	01Jul2007, 03:02
Total Inflow :	0.10 (AC-FT)	Total Outflow :	0.10 (AC-FT)

Print Close

Project : Emery Simulation Run : Run 1 Subbasin: HYD2C-a

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Discharge :	1.02 (CFS)	Date/Time of Peak Discharge :	01Jul2007, 03:00
Total Precipitation :	0.08 (AC-FT)	Total Direct Runoff :	0.04 (AC-FT)
Total Loss :	0.04 (AC-FT)	Total Baseflow :	0.00 (AC-FT)
Total Excess :	0.04 (AC-FT)	Discharge :	0.04 (AC-FT)

Print Close

Project : Emery Simulation Run : Run 1 Subbasin: HYD2C

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Discharge :	6.83 (CFS)	Date/Time of Peak Discharge :	01Jul2007, 03:01
Total Precipitation :	0.56 (AC-FT)	Total Direct Runoff :	0.29 (AC-FT)
Total Loss :	0.27 (AC-FT)	Total Baseflow :	0.00 (AC-FT)
Total Excess :	0.29 (AC-FT)	Discharge :	0.29 (AC-FT)

Print Close

HEC-HMS Output (continued):

Project : Emery Simulation Run : Run 1 Junction: HYD2T

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Outflow : 10.20 (CFS)	Date/Time of Peak Outflow : 01Jul2007, 03:00
Total Outflow : 0.43 (AC-FT)	

Print Close

Project : Emery Simulation Run : Run 1 Subbasin: HYDD-1

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Discharge :	0.58 (CFS)	Date/Time of Peak Discharge :	01Jul2007, 03:00
Total Precipitation :	0.08 (AC-FT)	Total Direct Runoff :	0.02 (AC-FT)
Total Loss :	0.06 (AC-FT)	Total Baseflow :	0.00 (AC-FT)
Total Excess :	0.02 (AC-FT)	Discharge :	0.02 (AC-FT)

Print Close

Project : Emery Simulation Run : Run 1 Reach: Ditch 1-B

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Inflow :	0.58 (CFS)	Date/Time of Peak Inflow :	01Jul2007, 03:00
Peak Outflow :	0.54 (CFS)	Date/Time of Peak Outflow :	01Jul2007, 03:04
Total Inflow :	0.02 (AC-FT)	Total Outflow :	0.02 (AC-FT)

Print Close

HEC-HMS Output (continued):

Project : Emery Simulation Run : Run 1 Subbasin: HYDD-2

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Discharge :	0.66 (CFS)	Date/Time of Peak Discharge :	01Jul2007, 03:00
Total Precipitation :	0.09 (AC-FT)	Total Direct Runoff :	0.02 (AC-FT)
Total Loss :	0.07 (AC-FT)	Total Baseflow :	0.00 (AC-FT)
Total Excess :	0.02 (AC-FT)	Discharge :	0.02 (AC-FT)

Print Close

Project : Emery Simulation Run : Run 1 Junction: HYDD

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Outflow : 1.08 (CFS)	Date/Time of Peak Outflow : 01Jul2007, 03:00
Total Outflow : 0.04 (AC-FT)	

Print Close

Project : Emery Simulation Run : Run 1 Junction: HYD1-2

Start of Run :	01Jul2007, 00:00	Basin Model :	Refuse Area
End of Run :	02Jul2007, 00:00	Meteorologic Model :	100-yr 6-hr
Compute Time :	01Nov2007, 16:31:00	Control Specifications :	Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Outflow : 11.29 (CFS)	Date/Time of Peak Outflow : 01Jul2007, 03:00
Total Outflow : 0.47 (AC-FT)	

Print Close

HEC-HMS Output (continued):

Project : Emery Simulation Run : Run 1 Reservoir: Culvert B

Start of Run : 01Jul2007, 00:00
End of Run : 02Jul2007, 00:00
Compute Time : 01Nov2007, 16:31:00

Basin Model : Refuse Area
Meteorologic Model : 100-yr 6-hr
Control Specifications : Control 1

Volume Units : ○ IN ◉ AC-FT

Computed Results

Peak Inflow : 11.29 (CFS)
Peak Outflow : 11.01 (CFS)
Total Inflow : 0.47 (AC-FT)
Total Outflow : 0.47 (AC-FT)

Date/Time of Peak Inflow : 01Jul2007, 03:00
Date/Time of Peak Outflow : 01Jul2007, 03:01
Peak Storage : 0.01 (AC-FT)
Peak Elevation : 941.49 (FT)

Print Close

Summary of HEC-HMS Results:

Project: Emery Simulation Run: Run 1

Start of Run: 01Jul2007, 00:00
End of Run: 02Jul2007, 00:00
Compute Time: 01Nov2007, 16:31:00

Basin Model: Refuse Area
Meteorologic Model: 100-yr 6-hr
Control Specifications: Control 1

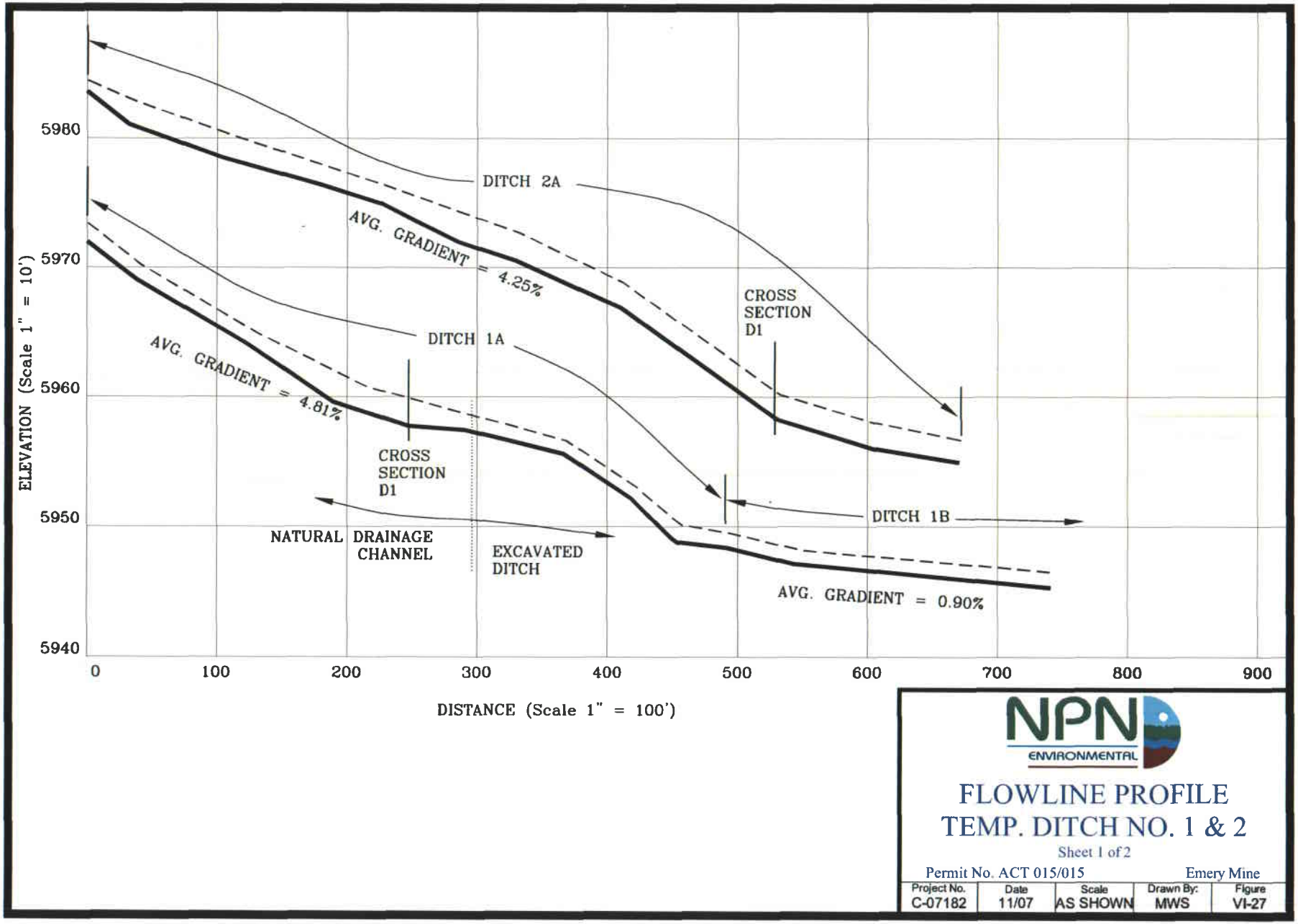
Volume Units: ○ IN ◉ AC-FT

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Culvert B	0.0114	11.01	01Jul2007, 03:01	0.47
Ditch 1-B	0.0008	0.54	01Jul2007, 03:04	0.02
Ditch 2-B	0.0031	2.57	01Jul2007, 03:02	0.10
HYD1-2	0.0114	11.29	01Jul2007, 03:00	0.47
HYD2	0.0031	2.73	01Jul2007, 03:00	0.10
HYD2A	0.0020	1.32	01Jul2007, 03:00	0.05
HYD2B	0.0011	1.41	01Jul2007, 03:00	0.05
HYD2C	0.0058	6.83	01Jul2007, 03:01	0.29
HYD2C-a	0.0008	1.02	01Jul2007, 03:00	0.04
HYD2T	0.0097	10.20	01Jul2007, 03:00	0.43
HYDD	0.0017	1.08	01Jul2007, 03:00	0.04
HYDD-1	0.0008	0.58	01Jul2007, 03:00	0.02
HYDD-2	0.0009	0.66	01Jul2007, 03:00	0.02

Summary of Ditch Flows:

Ditch	Peak Flow (cfs)	Peak Flow Depth (ft)	Peak Velocity (fps)
Ditch 2-A	2.7	0.3	3.8
Ditch 2-B	10.2~~1~~	0.9	2.8
Ditch 1-A	0.6	0.3	2.6
Ditch 1-B	1.1	0.4	1.6
Ditch 2-C	11.3~~1~~	0.6	4.8

Drainage off the top of the pile (HYD2C-a) was included in the HMS model. Peak runoff for the 100-year event is 1.0 cfs. Runoff is directed away from the outside slopes on the east and north sides and toward the southwest along the access road. The slope gradient along the access road is about 15%. A 1-foot wide ditch to convey this runoff down the slope would only flow 0.16 feet deep. Therefore, runoff controls are not necessary for this area and a ditch design is not proposed.



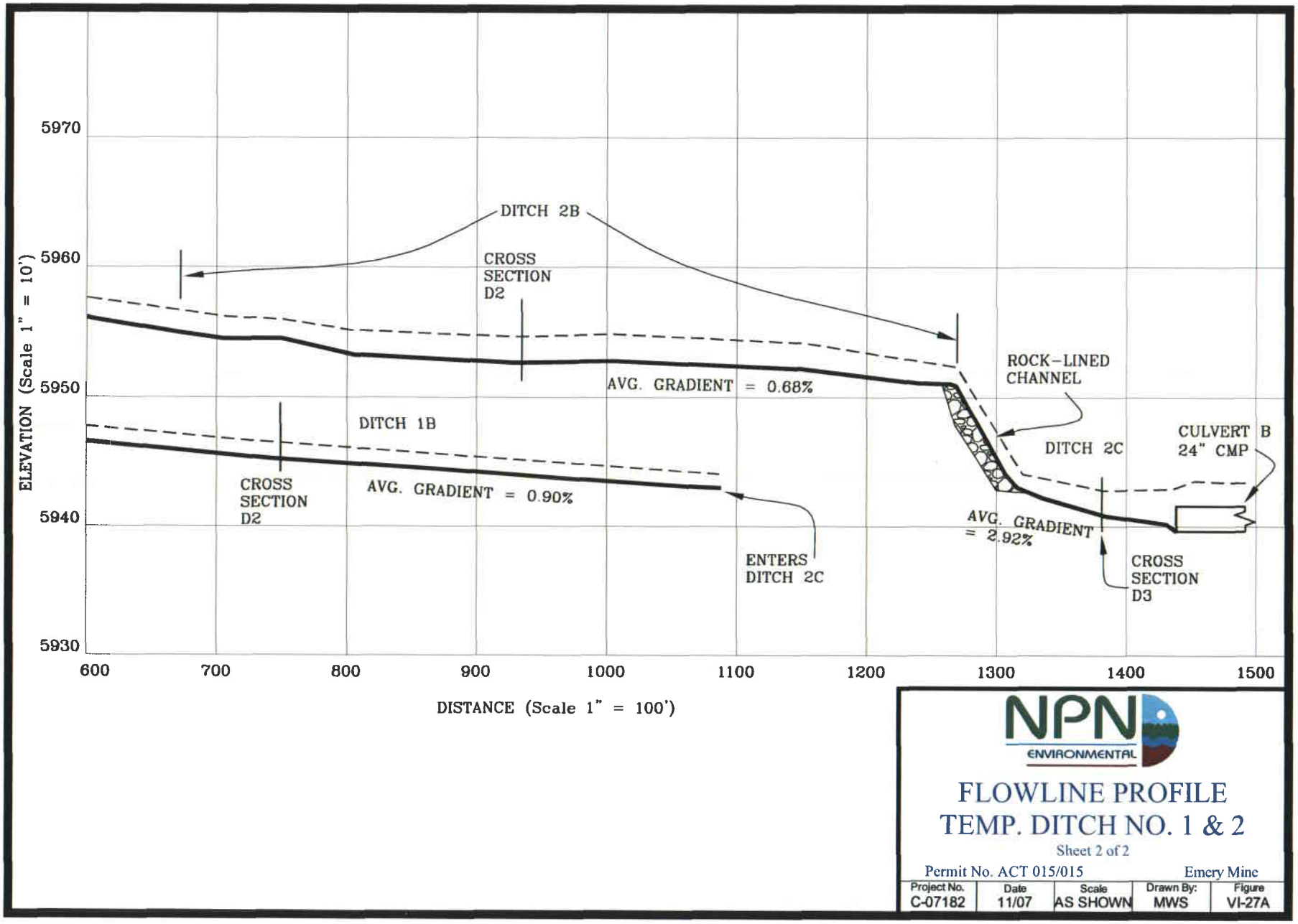
NPN ENVIRONMENTAL

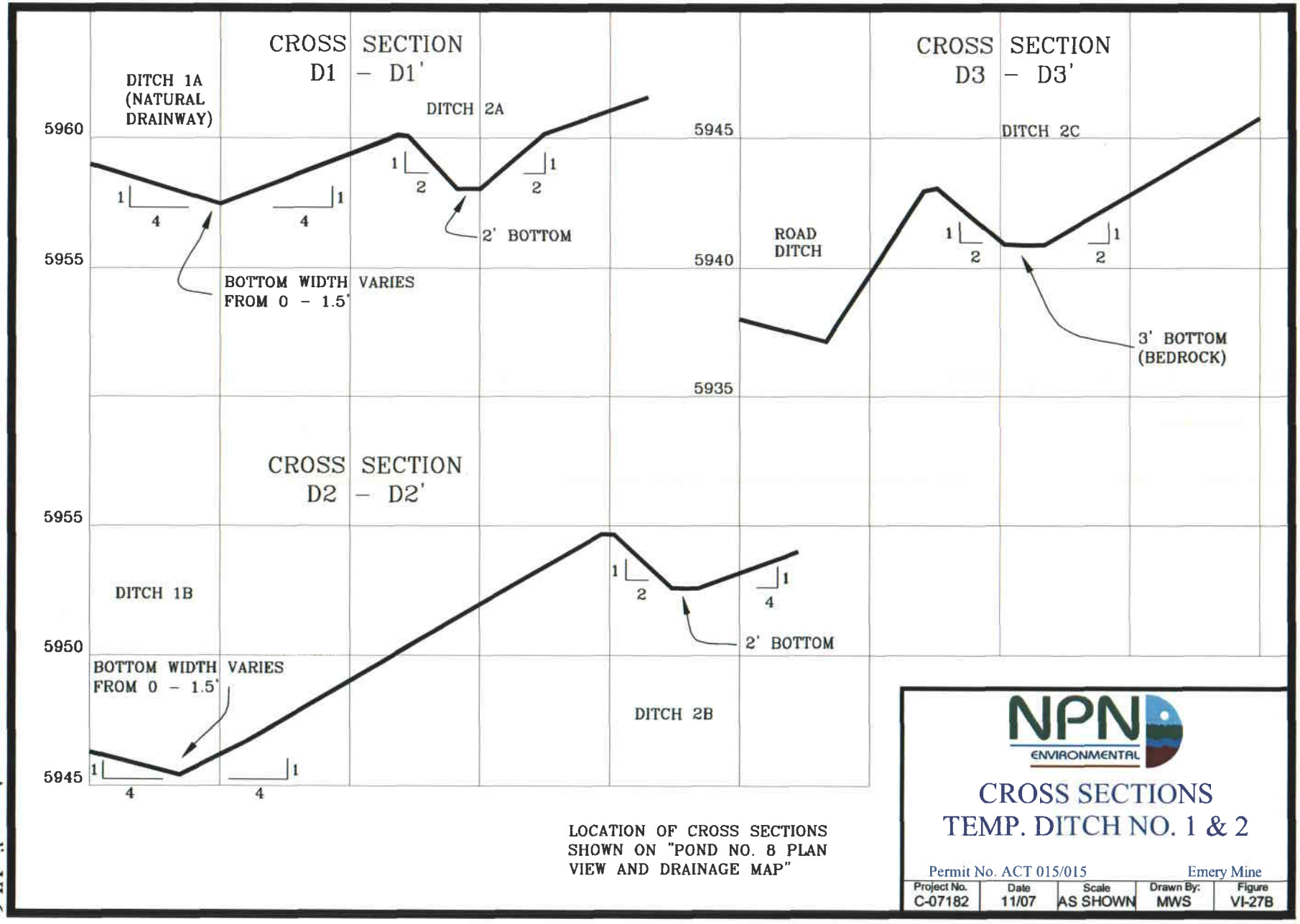
FLOWLINE PROFILE
TEMP. DITCH NO. 1 & 2

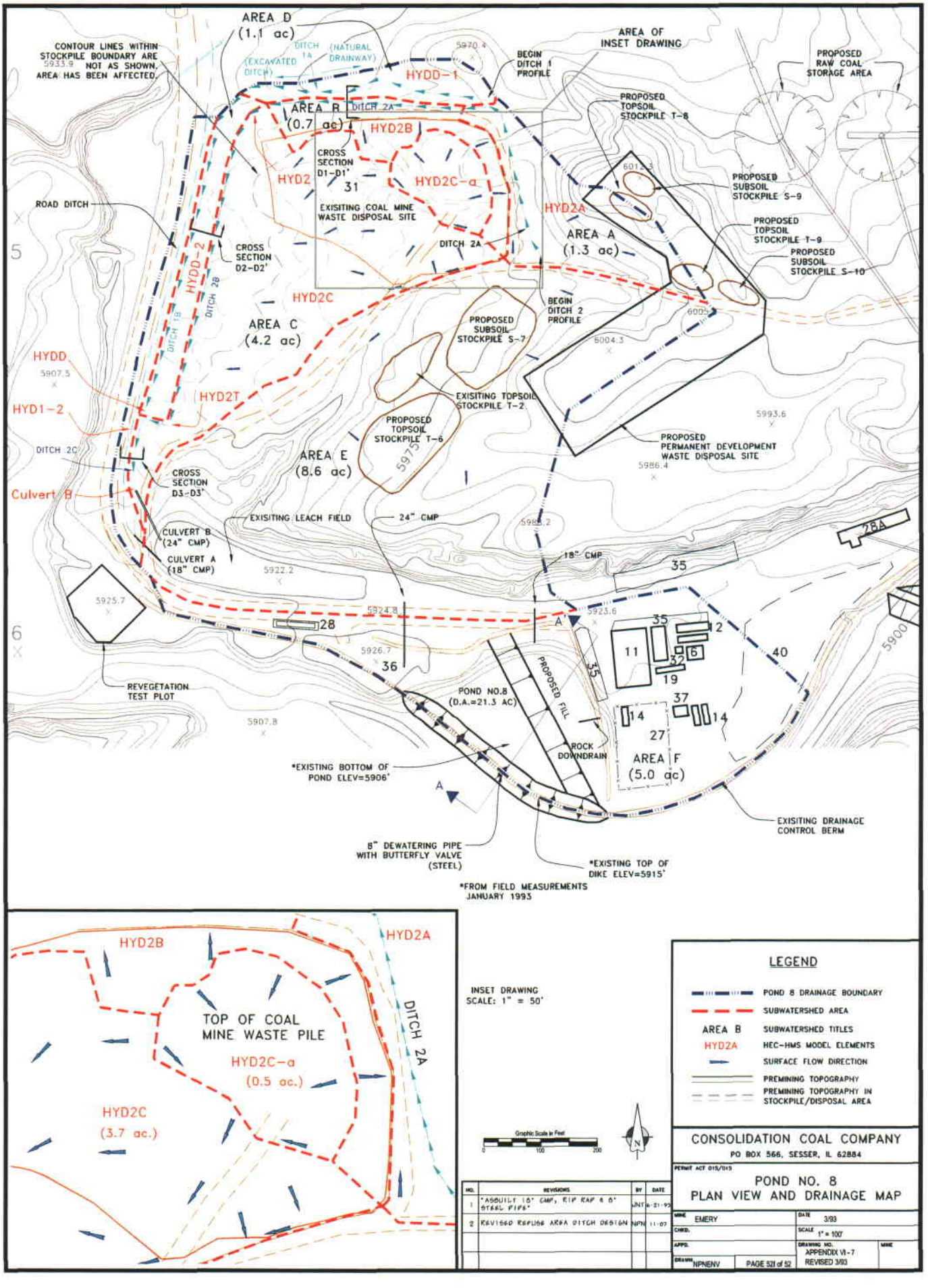
Sheet 1 of 2

Permit No. ACT 015/015 Emery Mine

Project No.	Date	Scale	Drawn By:	Figure
C-07182	11/07	AS SHOWN	MWS	VI-27


5970
5960
5950
5940
5930
ELEVATION (Scale 1" = 10')
600
700
800
900
1000
1100
1200
1300
1400
1500
DISTANCE (Scale 1" = 100')
DITCH 2B
CROSS SECTION D2
AVG. GRADIENT = 0.68%
ROCK-LINED CHANNEL
DITCH 2C
CULVERT B 24" CMP
DITCH 1B
CROSS SECTION D2
AVG. GRADIENT = 0.90%
ENTERS DITCH 2C
AVG. GRADIENT = 2.92%
CROSS SECTION D3
NPN ENVIRONMENTAL
FLOWLINE PROFILE
TEMP. DITCH NO. 1 & 2
Sheet 2 of 2
Permit No. ACT 015/015
Emery Mine
Project No. C-07182
Date 11/07
Scale AS SHOWN
Drawn By: MWS
Figure VI-27A


CROSS SECTION
D1 – D1'
DITCH 1A
(NATURAL
DRAINWAY)
DITCH 2A
5960
5955
1
4
1
4
1
2
1
2
2' BOTTOM
BOTTOM WIDTH VARIES
FROM 0 – 1.5'
CROSS SECTION
D3 – D3'
DITCH 2C
5945
5940
5935
ROAD
DITCH
1
2
1
2
3' BOTTOM
(BEDROCK)
CROSS SECTION
D2 – D2'
5955
5950
5945
DITCH 1B
BOTTOM WIDTH VARIES
FROM 0 – 1.5'
1
2
1
4
2' BOTTOM
DITCH 2B
1
4
1
4
LOCATION OF CROSS SECTIONS
SHOWN ON "POND NO. 8 PLAN
VIEW AND DRAINAGE MAP"
NPN
ENVIRONMENTAL
CROSS SECTIONS
TEMP. DITCH NO. 1 & 2
Permit No. ACT 015/015
Emery Mine
Project No. C-07182
Date 11/07
Scale AS SHOWN
Drawn By: MWS
Figure VI-27B



NO.	REVISIONS	BY	DATE
1	"ASBUILT 15" CMP, RIP RAP & 5' STEEL PIPE"	JNT	4-21-93
2	REVISED REFUSE AREA DITCH DESIGN	NPN	11-07

CONSOLIDATION COAL COMPANY
PO BOX 566, SESSER, IL 62884

PERMIT ACT 015/013

POND NO. 8
PLAN VIEW AND DRAINAGE MAP

MINE	EMERY	DATE	3/93
CHKD.		SCALE	1" = 100'
APPD.		DRAWING NO.	APPENDIX VI-7 REVISED 3/93
DRAWN	NPN/ENV	PAGE 521 of 52	MINE

PERMANENT WASTE DISPOSAL SITE DITCH

Runoff from the Permanent Development Waste Disposal Site will be directed to a ditch conveying the discharge to Pond No. 5. Per regulations, the ditch will be designed to handle the peak flow from a 100-year, 6-hour precipitation event. Total runoff for this event is 1.8 inches. The 100-year event will produce a peak flow of 6.9 cfs from the 1.5-acre drainage area.

The ditch will begin on the north side of the refuse site in a natural drainage channel. This portion of the ditch has a gradient of approximately 0.176 ft/ft. The terrain becomes flatter with a less defined drainage channel. A ditch will be excavated in this area to contain the flow. The vegetated ditch will have a 2-foot bottom width, 4:1 side slopes, and a gradient of 0.05 ft/ft.

Using Manning's Open Channel Flow Equation:

$$Q = \frac{1.49}{n} (A) (R)^{2/3} (s)^{0.5}$$

where A = area (ft^2)
R = area/wetted perimeter
s = ditch gradient

From trial and error, flow depth and velocity for each section are:

Steep, natural section – 0.59-foot flow depth at 6.6 fps
Flat, excavated section – 0.40-foot flow depth at 4.8 fps

In the upper section of the ditch, natural bedrock will prevent erosion. In areas where the bedrock is not adequate, riprap will be placed in the bottom of the channel. Flow velocity in the lower, flat section of the ditch is below 5 feet/second and will be vegetated to control erosion. A summary of the ditch geometry is shown in the table below. See *Ch VI Appendix VI, Figure 1* for plan view, profile, and cross sections of ditch and drainage area. A description of the watershed and computer model output used to calculate the peak flow is shown on the following pages.

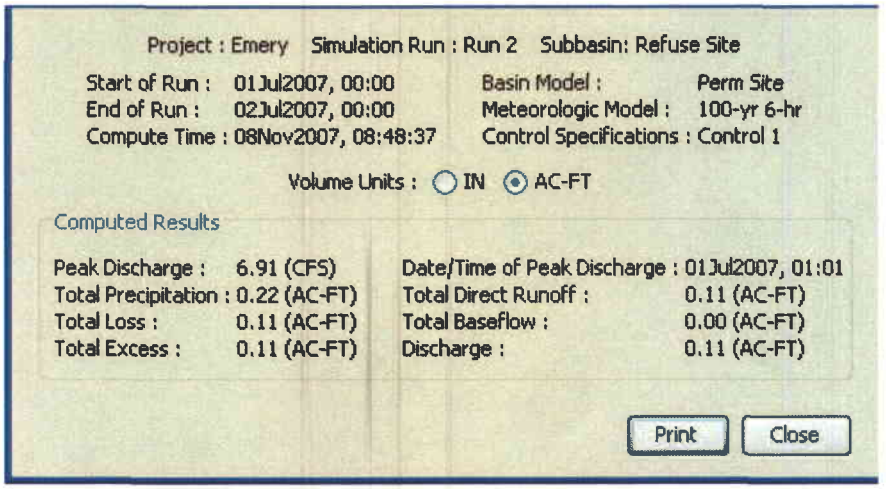
Ditch Geometry:

Ditch Segment	Length (ft)	Bottom (ft)	Side Slope (xH:1V)	Flow Gradient (ft V:1 ft H)	Manning's "n"	Lining
Upper (Natural)	170	0	3	0.176	0.040	Bedrock or Riprap
Lower	205	2	4	0.055	0.030	Earthen

HEC-HMS Hydrologic Model

The reclaimed permanent waste disposal site is located in a disturbed (pre-mine) borrow area. The waste will be covered and slopes established to direct flow to a ditch on the north side of the area. An average slope of the reclaimed site was assumed to be 3%. The lag time for the HMS model was calculated using a hydraulic length of 250 feet. The drainage area will be approximately 1.5 acres. Peak runoff for the 100-year event is 6.9 cfs. Output from the HMS model is shown below.

HEC-HMS Output:



Summary of HEC-HMS Results: